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Ceiling art in a radiation therapy department: its effect on patient treatment experience

Jotham Bonett, BAppSc (Med Rad)

Sunshine Hospital Radiation Therapy Centre, Melbourne, Vic., Australia

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Correspondence
Jotham Bonett, Sunshine Hospital Radiation Therapy Centre, 176 Furlong Road, St. Albans, Melbourne, Vic. 3021, Australia.
Tel: +61 4 3243 8208 (or) +61 3 8395 9841;
Fax: +61 3 8395 9950;
E-mail: jotham.bonett@petermac.org

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Abstract

Introduction: A new initiative has been implemented at the Sunshine Hospital Radiation Therapy Centre, to provide a calming and comforting environment for patients attending radiation therapy treatment. As part of this initiative, the department's computed tomography (CT) room and radiation therapy bunkers were designed to incorporate ceiling art that replicates a number of different visual scenes. The study was undertaken to determine if ceiling art in the radiation therapy treatment CT and treatment bunkers had an effect on a patient's experience during treatment at the department. Additionally, the study aimed to identify which of the visuals in the ceiling art were most preferred by patients. **Methods:** Patients were requested to complete a 12-question survey. The survey solicited a patient's opinion/perception on the unit's unique ceiling display with emphasis on aesthetic appeal, patient treatment experience and the patient's engagement due to the ceiling display. The responses were dichotomised to 'positive' or 'negative'. Every sixth patient who completed the survey was invited to have a general face-to-face discussion to provide further information about their thoughts on the displays. **Results:** The results demonstrate that the ceiling artwork solicited a positive reaction in 89.8% of patients surveyed. This score indicates that ceiling artwork contributed positively to patients' experiences during radiation therapy treatment. **Conclusion:** The study suggests that ceiling artwork in the department has a positive effect on patient experience during their radiation therapy treatment at the department.

Introduction

An important component of delivering accurate radiation therapy is to stabilise the patient in a comfortable and reproducible position. There are many devices used to help stabilise patients, including head and neck masks, foot locks and knee rests. Even with the use of these devices, patients' emotions can inhibit their ability to maintain the treatment position. It is these encounters that make engineers, architects and the radiation therapy community reconsider how treatment and scanning areas should be designed and built in radiation therapy departments.

In ancient and medieval times there was a strong focus in healing environments.[1] Unfortunately, this focus had been lost with increasing urbanisation and industrialisation.[1,2] Recently, the focus on 'healing environments' has been reconsidered. Bloemberg et al.[1] define healing environments as 'a treatment setting that sustains the healing process by creating a supportive physical and social environment'. These environments intend to promote a subjective sense of well-being, a reduction in stress and fatigue, and encourage a sense of hope and positive attitude in patients.[1]

Healing is defined as 'the process of helping someone return to health'.[3] In recent years, health care environments have been designed to implement art in an attempt to reduce stress, anxiety and increase patient satisfaction.[2] Studies have shown that a person with emotional congruence engages with their surrounding environment, and this engagement impacts and is projected in their state of mind.[2] This implies that in a stressful situation (i.e. a patient in a hospital environment), negative emotions are likely to be

projected.[2] In an environment where there are ambiguous or detrimental visual elements, both patients and staff can be under emotional stress.[2,4]

A healing and hopeful environment can be created for both patients and staff, which ultimately creates a positive distraction. Further, this has downstream implications in providing positive branding of a specific centre or environment. Becker et al.[4] found that, in patient-centred facilities, patients perceived their care to be significantly better when their interaction with staff was perceived to be of greater quality. This was associated with more positive environmental appraisals, improved mood, an altered physiological state and greater reported satisfaction by the patients.[5] This formed the basis of a new initiative at the Sunshine Hospital Radiation Therapy Centre (SHRTC), where considerations were made to provide a calming and comforting environment for patients attending radiation therapy treatment. Within SHRTC both the computed tomography (CT) rooms and radiation therapy bunkers were designed to have ceiling art that replicated a number of different visual scenes. These scenes included blue skies with surrounding trees (Fig. 1) and night scenes with images representing the external environment (Fig. 2). Beukeboom et al.[6] found that patients exposed to natural elements, such as real plants or images of natural surrounds, during their time in patient waiting rooms, reported lower levels of stress compared to those who were not exposed to any form of nature.

The study was undertaken to determine if ceiling art in the radiation therapy CT and treatment bunkers had an effect on a patient's experience during treatment at the department. Additionally, the study aimed to identify which of the visuals in the ceiling art were most preferred by the patient.

Figure 1. Radiation therapy bunker with the day theme ceiling art (SUN1).

Figure 2. Radiation therapy bunker with the night theme ceiling art (SUN2).

Materials

Patients

Patients were eligible to participate in this study if prescribed at least 10 daily attendances and laid in a supine position for the duration of their procedure. The average age of the patients who participated in the survey was 57.9 (range = 31–76). Patients of non-English-speaking background were excluded due to the availability of patient interpreters.

The project was approved by the Expedited Review Committee, a sub-committee of the Peter MacCallum Cancer Centre's Ethics Committee. This constitutes formal approval by the Ethics Committee.

Within the final week of their treatment course, patients were approached by the principal investigator (PI) and asked to complete a 12-question survey (Table 1). Possible question responses included strongly agree, agree, disagree, strongly disagree and non-applicable. The survey solicited patients' opinions on the unit's unique ceiling display, with emphasis on aesthetic appeal, patient treatment experience and the patients' engagement due to the ceiling displays. Every sixth patient recruited was also invited to participate (after verbal consent was obtained) in a general face-to-face discussion with the PI to obtain qualitative data as a measure to support the quantitative data in the surveys. The face-to-face discussions were not recorded or taped, but the patients' responses to the questions were noted in point form to assist in qualitative data investigations that might be applicable to the study (Table 2).

This discussion explored questions similar to that of the survey; however, additional information was gathered in the face-to-face discussion. During this discussion, emphasis was placed on individual patient preference

Table 1. The questions that the patients were asked to answer on the survey.

Questions
1. The ceiling artwork is visually appealing to me.
2. I preferred being in the treatment room with the day theme rather than the night theme.
3. The ceiling display creates a modern feeling in the department.
4. The ceiling displays enhance the environment. compared to other medical departments I have attended.
5. Installing ceiling artwork at other radiation therapy centres would be beneficial to their patients.
6. The artwork made me feel more comfortable in the treatment areas.
7. The ceiling artwork has helped me during my time in the radiation therapy department.
8. Overall, the ceiling artwork has played a positive role in my radiation therapy treatment.
9. I'd like to bring family and friends into the department to see the ceiling artwork.
10. The ceiling artwork encouraged conversation between staff and myself.
11. Staff appeared to be proud of the ceiling displays.
12. I have discussed the ceiling displays with my family and/or friends.

Table 2. The general questions that the patients were asked during the face-to-face discussions.

1. What was your first impression of the ceiling art display?
2. Can you describe the ceiling display in a few words?
3. Which theme do you prefer and why?
4. If you had a choice, what would you choose the display to be? (prompt if needed: personal photographs, different scenes, holiday destinations, etc.)
5. Would it be enhanced if the displays were able to move? i.e. video displays.
6. Have you had discussions about the artwork at home? If so, what was discussed?
7. Compared to other departments you may have attended for medical matters, does the ceiling display improve your time in the department? Why?
8. Has it enabled you to feel more relaxed during procedures?

relating to ceiling art (i.e. plain ceiling vs. ceiling art displays). In addition, patients' general opinion on the ceiling art displays was assessed and personal preference was gathered. This included questions about personal choice on artwork.

Equipment

The ceiling displays within the CT rooms and radiation therapy bunkers at SHRTC are permanent displays. The displays, manufactured by Flash Photobition (Sydney, New South Wales, Australia), consist of 62, 3 mm opal acrylic panels that were flatbed printed with UV set inks on the radiation therapy bunker ceilings and 28 panels in the CT rooms. SUN1 being the day themed ceiling display is a high-resolution photograph taken by the designers. This visual took into consideration the viewing distance of the occupant in the room, level, clarity of details of each image and the scale of the objects. SUN2, the night skies with stars theme are simple high-resolution images scaled up to size of the ceiling supplied by a professional photography website.

Above the panels contain banks of LED lights which enable the radiation therapists to control the brightness of the lights behind the panel. The lights are also synchronised with the surrounding room lights so they can be adjusted to the same level of brightness. The room lights can be adjusted to four individual levels. Patients were exposed to these ceiling displays depending on daily scheduling which allowed for best daily workflow in the department. All patients in the study were exposed to each of the ceiling displays throughout their treatment regime at least once.

Analysis

Survey responses to the questions included *strongly agree*, *agree*, *disagree* and *strongly disagree*. When applicable, participants could respond with *not applicable* and *didn't answer*. Each response had a numerical value corresponding to an answer. 'Strongly agree' was given a numerical value of 4. 'Strongly disagree' was given a value of 1. The responses were dichotomised to 'positive' and 'negative' with a total mean score found after applying a numerical value to each response. These values were then used to determine whether ceiling displays elicited a positive or negative reaction in patients.

Patients' responses to the interview questions were noted in point form and collated into themes to support the qualitative data investigations.

Results

Between June and October 2011, 42 patients of the SHRTC were invited to participate in the study. A total of 41 patients were surveyed and every sixth participant was invited to undertake a general face-to-face interview in conjunction with the survey. Six 10-min face-to-face interviews were conducted. The patient demographics (Table 3) showed that the common primary cancer was breast cancer. Breast cancer accounted for approximately two thirds (68%) of the total patients surveyed, all of which were female. Of the total patient cohort, 625 (54%) treatment fractions were treated on the ceiling display with the day theme (SUN1). The remaining 535 (46%) treatment fractions were subsequently treated in

Table 3. Patient characteristics of the study participants from the survey and interview.

Patient characteristics	Survey		Interview	
	n	%	*n*	%
Sex				
Male	13	31	3	50
Female	28	69	3	50
Tumour location				
Breast	27	66	3	49.9
Head and neck	4	10	1	16.7
Pelvis	7	17	1	16.7
Chest/abdomen	3	7	1	16.7
Machine (total fraction schedule)				
SUN 1 (day theme)	625	54	118	63
SUN 2 (night theme)	535	46	69	37
Patients (no. of fractions)				
10>19	1	2	0	0
20>29	19	46	1	16.7
30>39	21	52	5	83.3

the presence of the composite image (night theme (SUN2)).

Results derived from the patient preference survey (question 2 of the survey) demonstrated that patients did not have an overall preference for either theme. The survey revealed that 15 patients (37%) favoured SUN1, while the other 14 patients equating to approximately 34% of the patient cohort group described a preference for SUN2. The remaining 12 patients (29%) had no overall preference, which was extrapolated from the patient's non-response. Further examination of the patients' responses to the 12-question survey (Table 1) revealed that patients rated these questions exclusively with a positive response (Fig. 3). The data are consistent with the solicitation of a positive response in 442 responses (89.8%) (Fig. 4) of the total questions answered during the study.

During the face-to-face discussions, patients stated that they regularly discussed the SHRTC's ceiling artwork with family and friends. Those assessed during the face-to-face discussion displayed a 'passion' for the ceiling art. All 41 (100%) patients suggested that similar ceiling art be implemented in other hospital departments previously visited (i.e. diagnostic imaging or chemotherapy day wards). All six patients surveyed in the face-to-face interview expressed that the presence of the ceiling art had improved their experience, while being treated at the SHRTC. Patients had positive connotations towards their treatment at the SHRTC in the presence of the ceiling art. They expressed their experiences as 'amazing', 'comforting', 'modern', 'relaxing', 'calming' and 'having a feeling of peace'.

Discussion

The SHRTC is one of the first radiation therapy centres in Australia to have ceiling art displays in both their radiation therapy bunkers as well as their CT rooms. Results of this study suggest that investing in ceiling art in a radiation therapy department improves the aesthetic

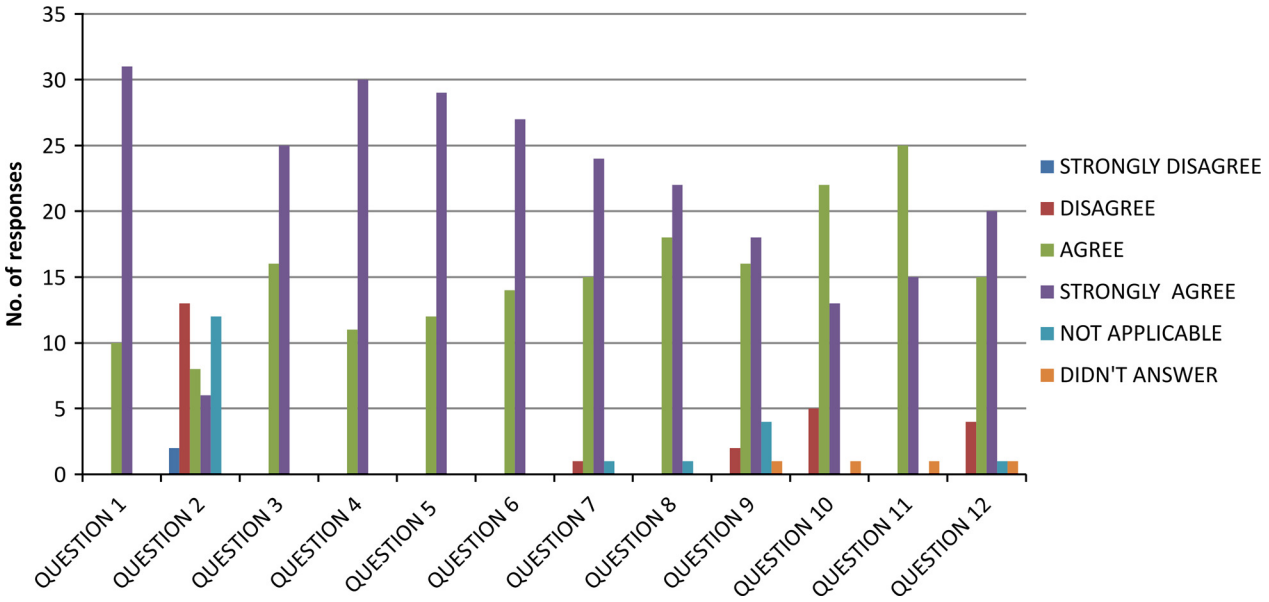

Figure 3. Patient survey responses for each survey question. Refer to Table 1 for the 12 survey questions.

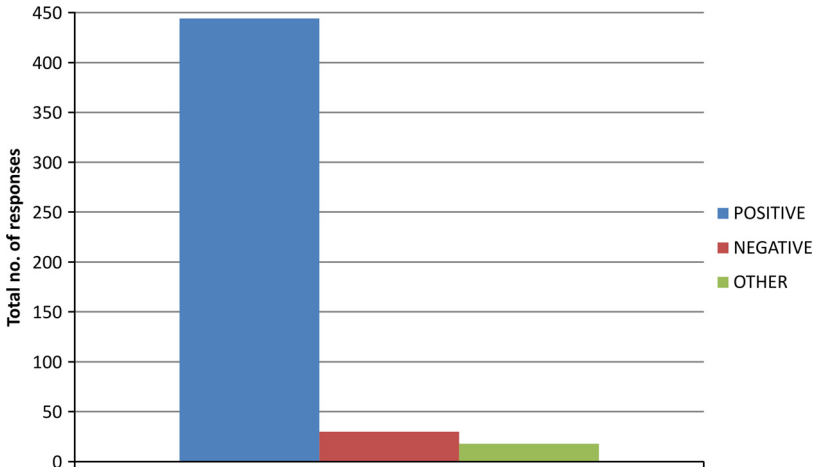

Figure 4. Amount of positive (blue), negative (red) and other responses (green) during the survey.

appeal from a patient perspective, facilitates patient engagement and has an overall positive effect on the patient experience during radiation therapy treatment.

Beukeboom et al.[6] found that by improving the aesthetics of the waiting room, by the addition of live plants or images of plants, hospitals can create a pleasant atmosphere that positively influences patients' well-being. The SHRTC has designed its radiation therapy bunkers to incorporate natural elements with trees and skies and added a futuristic night scene to cater for all patient preferences.

Day versus night

One of the study aims was to determine which, if any, ceiling display was preferred by the patients and whether one ceiling art was preferred over the other. The data showed that 71% of patients preferred one theme over the other, while 29% had no preference in ceiling themes. Some patients suggested that other possible displays could be used if the ceilings artwork were redesigned. For example, designs that incorporate beach themes, tropical paradises with palm trees and images of waterfalls were commonly suggested. Further, patients also suggested that the ceiling displays be digital and contain animating features. These suggestions included adding shooting stars to the night theme or swaying trees and flying birds to the day theme. Other patient suggestions included individualising ceiling artwork displays, where a patient could request to have images of their family and friends uploaded onto a digital screen on the ceiling.

At the time of the study, the SHRTC was still relatively new and was not working to full capacity in a single working day. Due to the low patient numbers being prescribed radiation therapy treatment at the SHRTC, SUN2 was being operated to approximately 67% capacity per working day. During the remainder of the day the physical sciences department were using the machine for research and quality assurance procedures resulting in a reduction in the number of patients being treated on this unit. It is due to this that there was a reduction in the amount of total fractions that were being treated on this unit.

Healing environments

Much of the literature read with respect to radiation therapy and general hospital environments referred to healing environments.[1,2] A healing environment is created by a number of different elements; most of these elements place great emphasis on nature. Natural elements such as daylight, fresh air, peace and quietness are fundamental to healing environments. During the study, questions soliciting patients' opinions on aesthetic appeal and treatment experience resulted in a positive reaction from the participants. This indicates that the ceiling displays at the SHRTC had a positive effect on patient treatment experience.

Supporting this study, Fouts and Gabay[7] list a number of advantages that healing environments have. These include a reduction in stress and anxiety for patient and family members and also improved patient satisfaction. Beukeboom et al.[6] found that the more aesthetic the patient room, the lower the stress levels of the patients contained within those rooms. This study supported this finding, as the results of question 6, which asked patients if they felt more relaxed and comfortable in the treatment areas due to the ceiling displays, were all answered positively. Furthermore, when the patients were asked if the ceiling artwork played a positive role in patients' radiation therapy

treatment, all yielded a positive response. Consequently, this study also supports the incorporation of 'healing environments' into the design of radiation therapy departments and hospitals. All patients surveyed recommended that the ceiling displays in the SHRTC should be installed within all radiation therapy centres. They were described as being modern, visually appealing and an improvement from other departments that the patients had attended, for example diagnostic imaging and chemotherapy units.

Limitations

At the time of the study, the SHRTC was still undertaking elements of commissioning, and not treating at full capacity. Subsequently, this reduced the number of patients available to participate during the study period. The commissioning activities also resulted in less fractions of treatment occurring on the radiation therapy treatment bunker with the night theme ceiling display compared to the day theme. This was due to the night theme only being used for two thirds of the working day.

Another limitation was the SHRTC's location. The SHRTC is located in the western suburbs of Melbourne, where there is a high percentage of non-English speaking patients. Due to this, a number of patients were unable to understand English and therefore were unable to participate in the study as interpreters were unavailable during the time of the study.

Currently, the SHRTC has two operational radiation therapy bunkers and has two further radiation therapy bunkers ready to be commissioned as demand increases. It is hoped that the SHRTC repeats the study when four bunkers are commissioned as this would provide for a greater range of displays including a red themed night display and a different day theme display.

To improve the study, it is suggested that researchers increase the cohort of patients surveyed by increasing the length of the study and utilising interpreters to survey non-English-speaking patients.

Conclusion

The major findings of this study suggest that ceiling art in a radiation therapy department improves aesthetic appeal from a patient perspective, facilitates patient engagement and has an overall positive effect on the patient experience during radiation therapy treatment. The study suggests that patients are affected positively by both themes of ceiling displays. This study has improved our understanding of the relationship between patient room aesthetic and a patient's perspective while undergoing radiation therapy treatment. This study can also be extended to look at the effects similar artworks have on staff administering radiation therapy treatment at the SHRTC.

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Conflict of Interest

The author declares no conflict of interest.

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